

HGSS Grid File Description

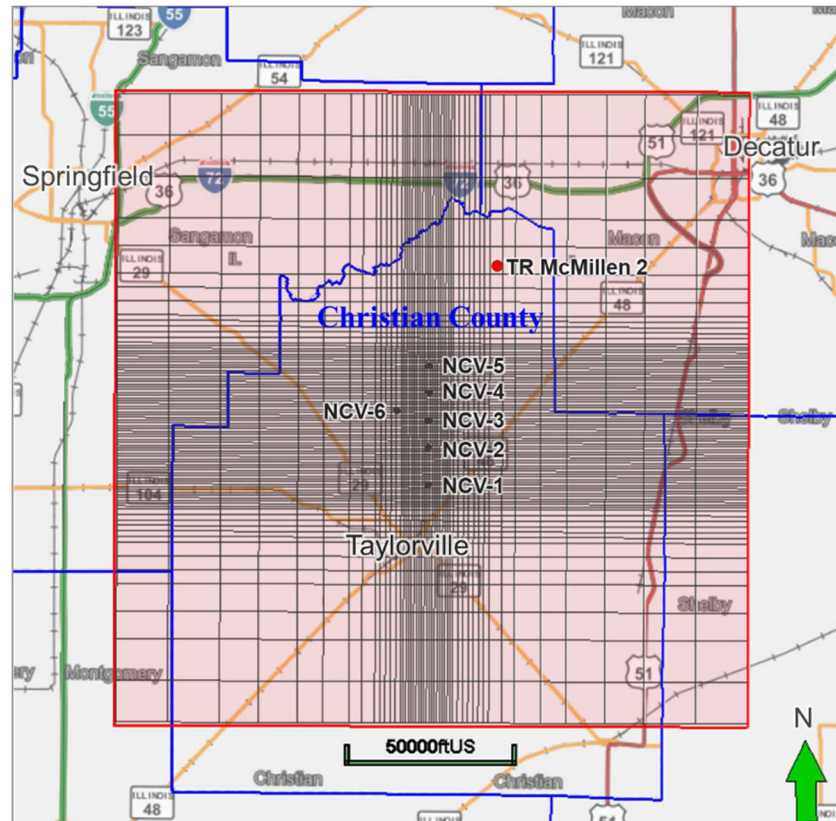


Figure 1. SEM footprint for the HGSS. Six proposed injection wells are positioned northeast of Taylorville, Illinois, and are central to the SEM's 35x35 mile tartan grid.

The HGSS SEM spanned 35x35 miles as shown in **Figure 1**. The coordinates and model domain information are summarized in **Table 1**. A preliminary “regular grid” model framework had cell dimensions of 500 x 500 feet with varying cell thicknesses dependent on the proportional layering summarized in Table 2. The SEM was partitioned to capture the prevailing Mt. Simon zones broadly. These zones are based on TR McMillen 2 well log signatures and interpretations. For Dynamic Reservoir Modeling (DRM), the SEM’s grid was upscaled to a tartan grid with varying horizontal cell sizes ranging from 500ft to 10,000ft (**Table 2**) and preserved the original layering scheme as detailed in

Table 3.

Well tops from FutureGen 2, the IBDP CCS#1, and the TR McMillen 2 well were used to update key regional model surfaces, including the Maquoketa Shale, Eau Claire, Mt. Simon, and the Precambrian top. The model framework was further developed by inserting zones between these surfaces with the goal of representing the Eau Claire Formation (caprock), Mt. Simon Sandstone (reservoir), the thin underlying Argenta Formation, and the upper 100 feet of basement rock.

Figure 2 shows an oblique view of the SEM area, nearby Mt. Simon wells, and proposed HGSS injection wells within the context of the regional Mt. Simon surface.

Table 1. Model domain information.

Coordinate System	GCS North American 1983		
Well Known Text	PROJCS["NAD_1983_BLM_Zone_16N_ftUS", GEOGCS["GCS_North_American_1983", DATUM["D_North_American_1983", SPHEROID["GRS_1980",6378137.0,298.257222101]], PRIMEM["Greenwich",0.0], UNIT["Degree",0.0174532925199433]], PROJECTION["Transverse_Mercator"], PARAMETER["False_Easting",1640416.66666667], PARAMETER["False_Northing",0.0], PARAMETER["Central_Meridian",-87.0], PARAMETER["Scale_Factor",0.9996], PARAMETER["Latitude_Of_Origin",0.0], UNIT["Foot_US",0.304800609601219], AUTHORITY["EPSG",32166]]		
Description	NAD83 UTM16N meters to NAD83 UTM16N feet		
Coordinate System Units	Feet		
Coordinates			
Axis	Min	Max	Delta
X	908962.84	1096442.06	187479.22
Y	14316704.07	14503202.68	186498.60
Lat	~39.39437374	~39.91914629	~0.52477255
Long	~-89.60812712	~-88.92579328	~0.68233384
Elevation depth [ft] (mean sea level)	-7279.79 (model base)	729.31 (ground level)	8009.09

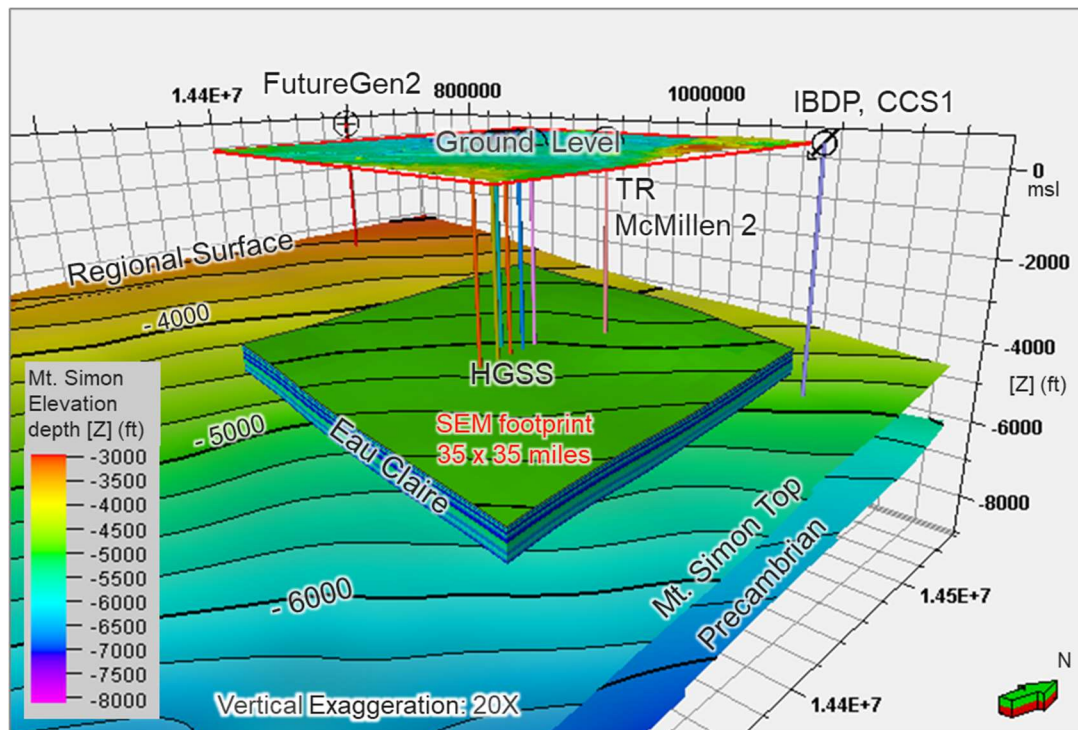


Figure 2. Oblique view of 35x35 mile SEM footprint for the HGSS. Proposed CO₂ injection wells for the HGSS are arranged south to north.

Table 2. Tartan grid scaling in x and y-directions.

No. of X cells	feet	No. of Y cells	feet
2	10000	-	-
2	7500	2	7500
2	5000	2	5000
2	2500	3	2500
5	1000	6	1000
20	500	60	500
7	1000	5	1000
2	2500	3	2500
2	5000	2	5000
2	7500	3	7500
2	10000	-	-

Table 3. SEM layering showing all model zones used the proportional layering method. The layering scheme was preserved for all petrophysical modeling zones.

Model Zone Top	Regular Grid Model, Number of layers:	Tartan Grid Model, Number of layers:	Petrophysical Modeling (Porosity and Permeability)	Comments
Ground Elevation	5	1	No	Ground-level
Maquoketa	3	1	No	Shale
Galena	6	1	No	Carbonate
St. Peter	4	1	No	Deepest USDW
Shakopee Dolomite	10	1	No	Knox Supergroup
Ironton	6	6	Yes	Saline Aquifer
Eau Claire	15	15	Yes	Caprock
Mt Simon E	10	10	Yes	Reservoir
Mt Simon D	10	10	Yes	Reservoir
Mt Simon C	10	10	Yes	Reservoir
Mt Simon B	15	15	Yes	Reservoir
Mt Simon A Upper	12	12	Yes	Reservoir
Mt Simon A Lower	12	12	Yes	Reservoir
Argenta	3	3	Yes	Tight zone
Weathered basement	4	4	Yes	Tight zone
Precambrian basement	4	4	Yes	Top 100 ft

Layer Sum:	129	106		
Model Cell Count:	17,374,752	437,568		

As shown in **Figure 1**, a tartan grid was implemented laterally with the smallest grid cells in the nearby vicinity of the injection wells. Cell block sizes are listed in **Table 2**. The grid cell size was increased with increased distance from the wells and as the model boundary was approached. The cells block sizes at the corners of the well model boundary were approximately 15,000 feet by 12,000 feet where there is no anticipated fluid communication.

The vertical gridding scheme included cell block thickness ranging from a minimum of 5 feet at the wells to 36 feet at the model periphery and in shallower formations where no fluid communication is anticipated. The vertical gridding scheme in the dynamic model is visually illustrated in **Figure 3**.

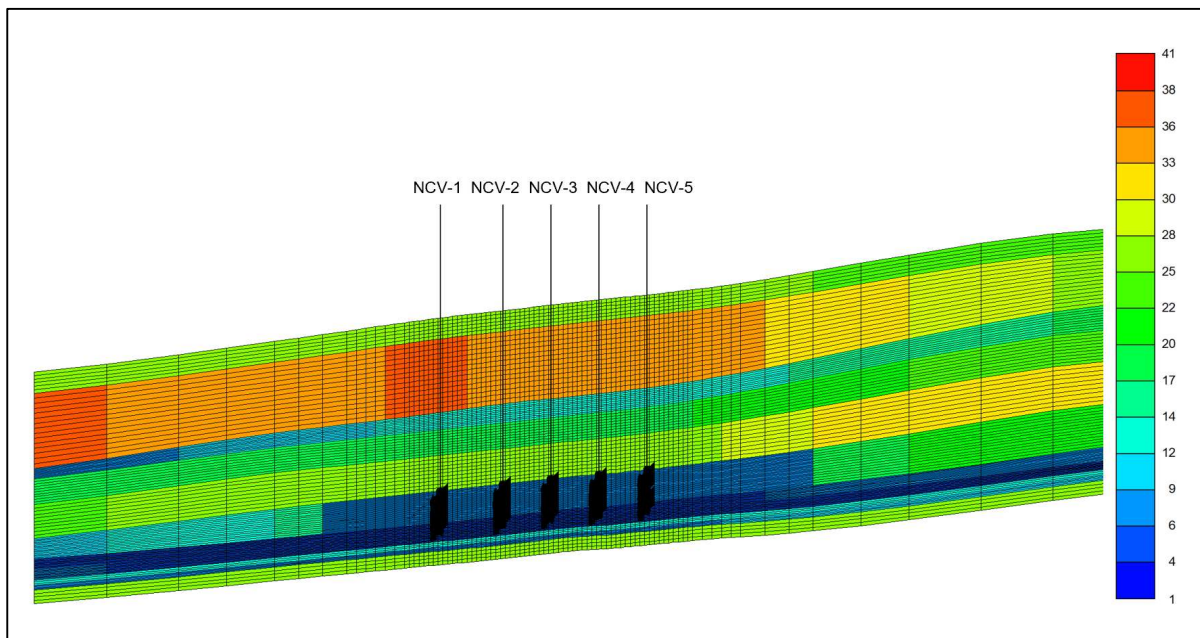


Figure 3. Vertical gridding scheme for HGSS reservoir model.